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Natural Hazard Preparedness and Mitigation in India

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Hazard Proneness of Indian Sub-Continent

- Earthquakes (59%) Cyclones (8%), Floods (5%) Landslides (Northeastern states, Sections of Western & Eastern Ghats, Vindhyas)
- The Sub Continent has emerged as a hot spot of devastating earthquakes related to both Intra plate & Inter-plate Seismicity
- Most common seismic hazards are, *ground shaking*, *liquefaction, landslides, tsunami*.

Being constantly under threats of natural hazards

- Country has developed its own

  Policies, Practices, Strategies for Disaster Preparedness and Mitigation

- Paradigm shift in its approach to Disaster Management

  From Relief Centric to Holistic based on, understanding of hazards, preparedness, mitigation, prevention, quick response

First organized effort at national level

- Constitution of High Powered Committee on Disaster Management (1999-2001) with mandate for evolving systematic, comprehensive & holistic approach.
- Recommendations – New Culture of disaster management standing on four pillars of
  - Culture of *Preparedness*
  - Culture of *Quick Response*
  - Culture of *Strategic Thinking*
  - Culture of *Prevention*
- Establishment of NCDM – Now NIDM

National Disaster Management Act (2005)

Disaster Management Integrated with Development Process

(First time 10th FYP reflects it) (2002-2007)

National Policy of Disaster Management (NPDM - 2009)

Proactive multi disaster oriented and Technology driven approach aimed at,

- Vulnerability reduction
- Management of DRR policies
- Capacity development
- Knowledge Management, Education, R&D, S&T

Understanding of Hazards

- Sizeable database has been generated on various aspects of Seismic Hazard Evaluation
- Application of such database developed by various organizations provide at planning stage itself vital inputs for developing remedial strategy for earthquake safe development.

To substantiate and updating existing database work is going on

a) establishing dense network of seismic observatories for developing area specific seismological parameters e.g. attenuation relationships;

b) preparing / updating active fault maps of the region and establishing recurrence interval of major earthquakes;

c) formulation of necessary building codes and bylaws including active fault zones;

d) preparing / updating seismic microzonation maps for the most vulnerable cities;

e) implementation and enforcement of building codes & regulations;

f) promoting indigenous technology for earthquake safe housing; and

g) enhancing capacity and creating awareness for earthquake safe constructions.

National Plan of Disaster Management

Vision
"Safe and Disaster Resilient India"

- National Response Plan
- National Mitigation Plan
- National Capacity Building Plan

Earthquake Risk Mitigation

India being a signatory to Yokohama strategy (1994) under IDNDR Initiatives have been taken in following areas:

a) Strengthening of Seismological instrumentation network

b) Hazard mapping and vulnerability assessment of buildings

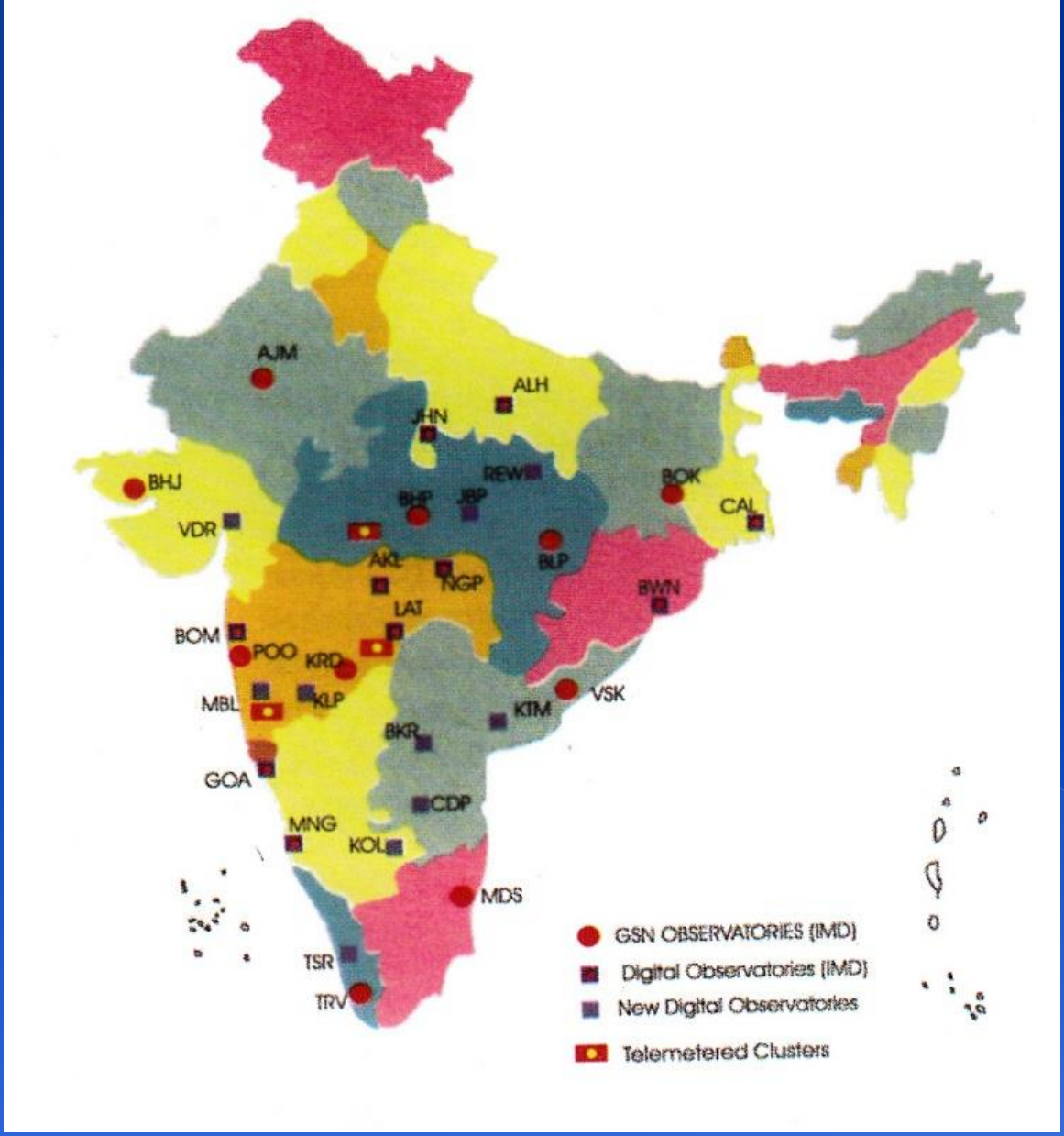
c) Promoting earthquake resistant construction

d) Seismic strengthening and retrofitting

e) Strengthening regulatory framework for mandating compliance to Codes and Standards, by amending building by laws and land use zoning practices.

f) Capacity development – education, training, research and development, capacity building and documentation of lessons learnt.

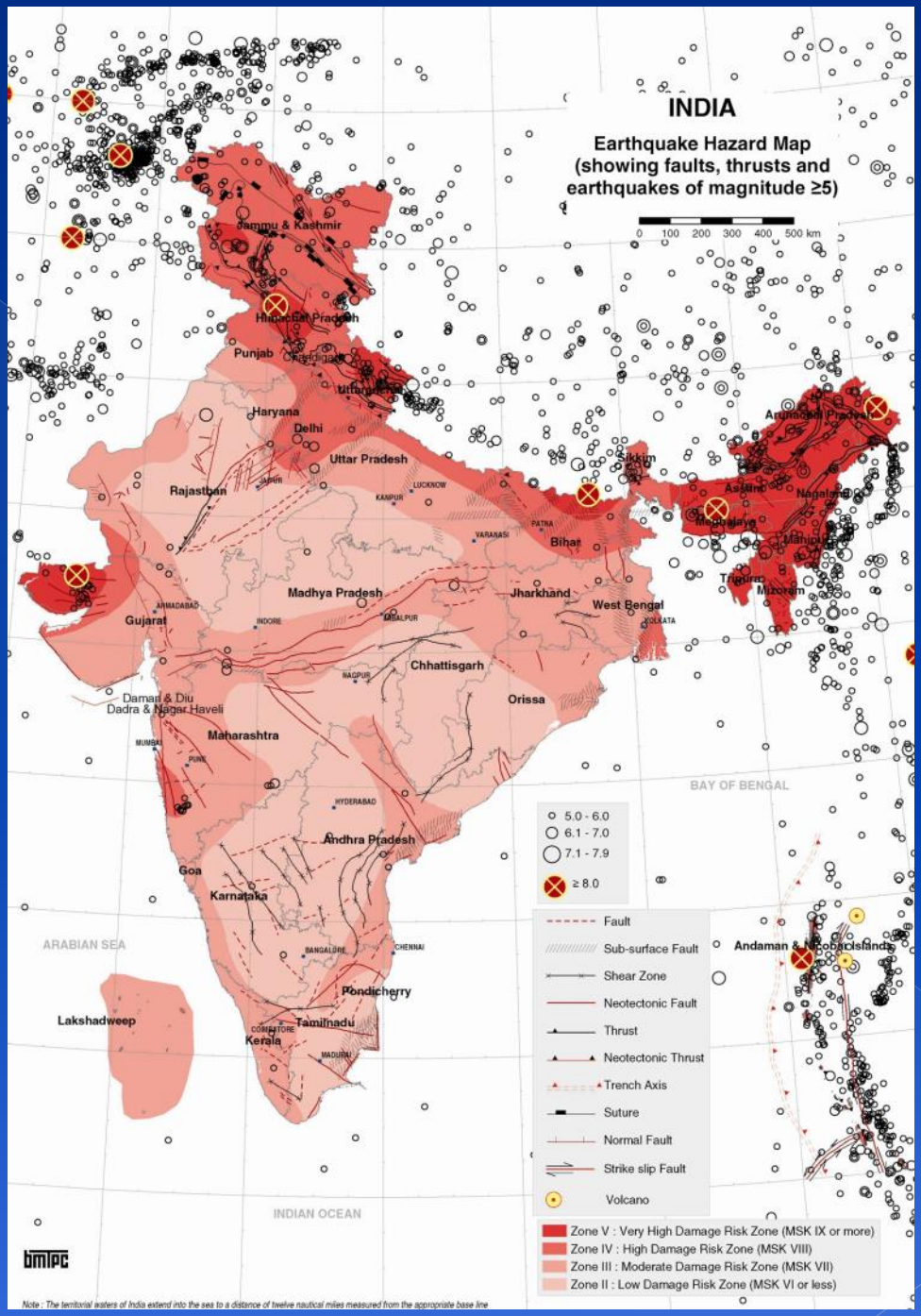
Seismological Network

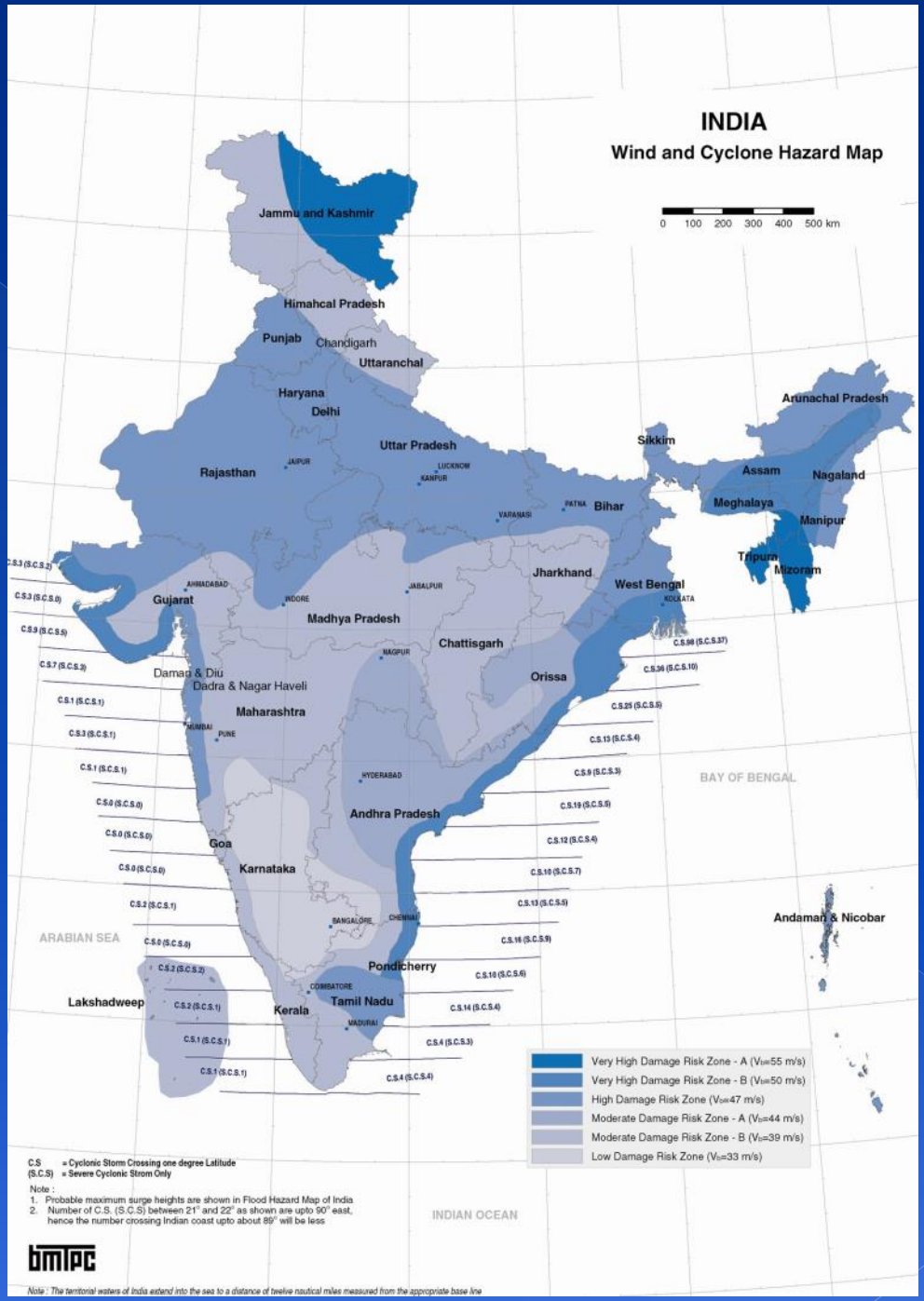


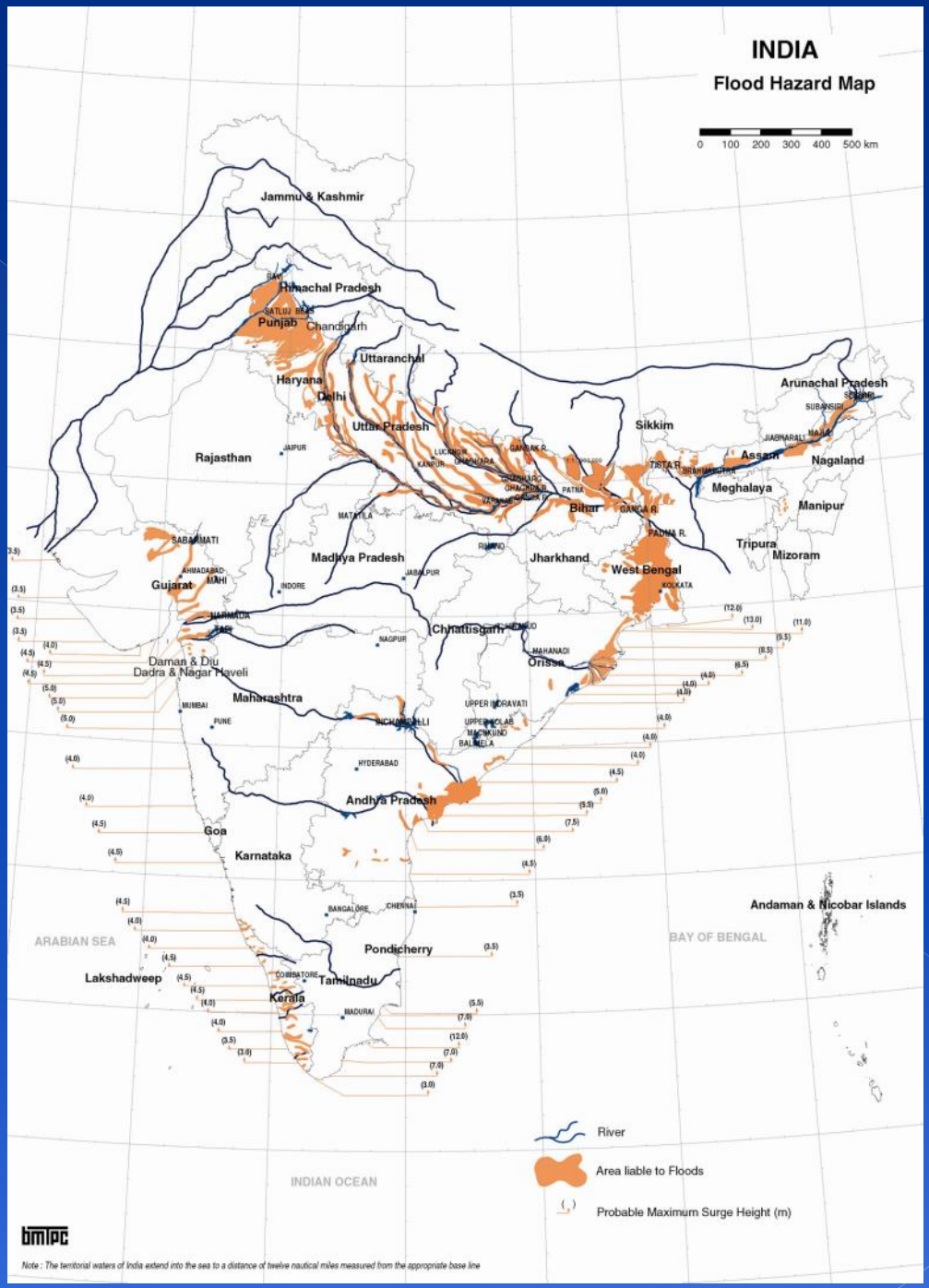
Vulnerability Atlas of India has been prepared

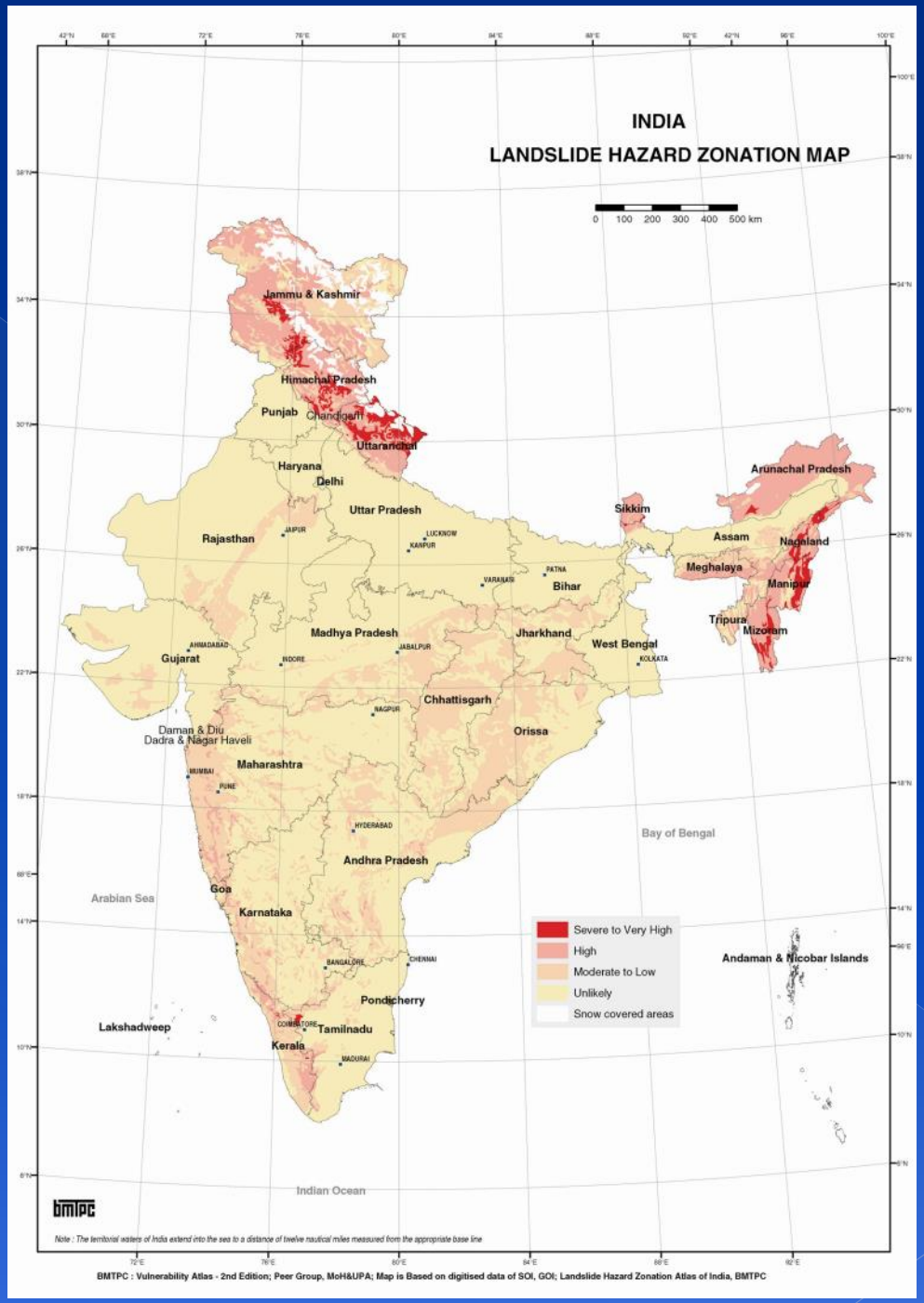
It provides-

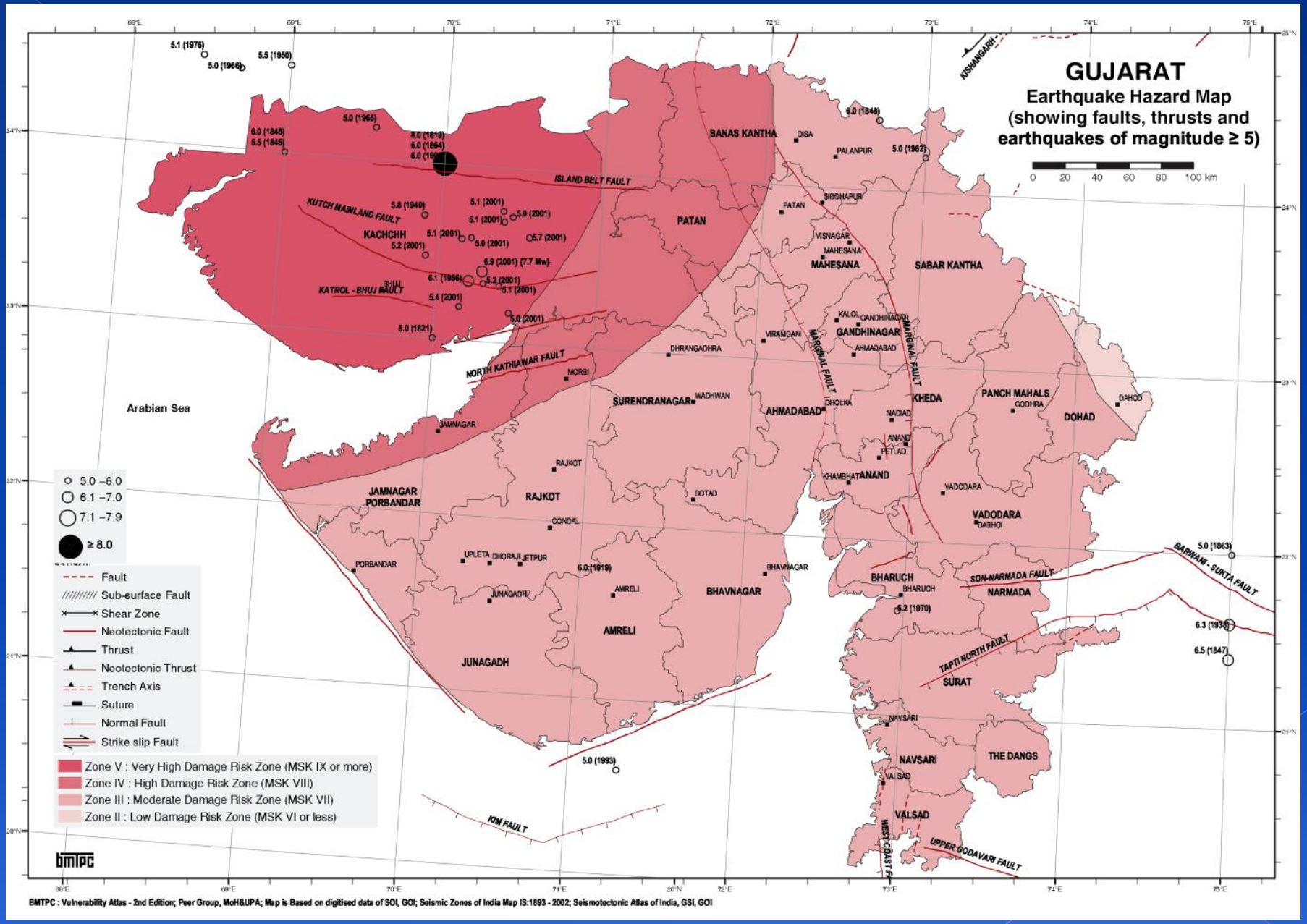
- Country level hazard maps for earthquakes, cyclones, Floods, Landslides
- State level hazard maps upto district level
- Risk Tables for all Housing Types – National / State / District wise
- Techno-Legal aspects – Building Rules, Bye-Laws, Development Control, Land-use zoning
- Technical Guidelines for design and construction of disaster safe buildings


INDIA
Earthquake Hazard Map
(showing faults, thrusts and
earthquakes of magnitude ≥5)
0 100 200 300 400 500 km
Jammu & Kashmir
Himachal Pradesh
Punjab
Uttaranchal
Haryana
Delhi
Uttar Pradesh
Rajasthan
Bihar
Sikkim
Arunachal Pradesh
Assam
Nagaland
Meghalaya
Manipur
Tripura
Mizoram
Madhya Pradesh
Jharkhand
West Bengal
Gujarat
Chhattisgarh
Orissa
Daman & Diu
Dadra & Nagar Haveli
Maharashtra
Andhra Pradesh
Goa
Karnataka
Pondicherry
Tamilnadu
Kerala
Lakshadweep
Andaman & Nicobar Islands
BAY OF BENGAL
ARABIAN SEA
INDIAN OCEAN
AHMADABAD
INDORE
AMALPUR
NAGPUR
MUMBAI
PUNE
HYDERABAD
BANGALORE
CHENNAI
COIMBATORE
MADURAI
KANPUR
LUCKNOW
VARANASI
PATNA
KOLKATA
5.0 - 6.0
6.1 - 7.0
7.1 - 7.9
≥ 8.0
Fault
Sub-surface Fault
Shear Zone
Neotectonic Fault
Thrust
Neotectonic Thrust
Trench Axis
Suture
Normal Fault
Strike slip Fault
Volcano
Zone V : Very High Damage Risk Zone (MSK IX or more)
Zone IV : High Damage Risk Zone (MSK VIII)
Zone III : Moderate Damage Risk Zone (MSK VII)
Zone II : Low Damage Risk Zone (MSK VI or less)
bmtpc
Note : The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line


INDIA
Wind and Cyclone Hazard Map
0 100 200 300 400 500 km
Jammu and Kashmir
Himahcal Pradesh
Punjab
Chandigarh
Uttaranchal
Haryana
Delhi
Uttar Pradesh
Rajasthan
JAIPUR
LUCKNOW
KANPUR
VARANASI
PATNA
Bihar
Sikkim
Arunachal Pradesh
Assam
Nagaland
Meghalaya
Manipur
Tripura
Mizoram
Jharkhand
West Bengal
KOLKATA
Gujarat
AHMADABAD
INDORE
JABALPUR
Madhya Pradesh
Chattisgarh
NAGPUR
Orissa
Daman & Diu
Dadra & Nagar Haveli
Maharashtra
MUMBAI
PUNE
HYDERABAD
Andhra Pradesh
Goa
Karnataka
BANGALORE
CHENNAI
Pondicherry
COIMBATORE
Tamil Nadu
Kerala
MADURAI
Lakshadweep
ARABIAN SEA
BAY OF BENGAL
Andaman & Nicobar
INDIAN OCEAN
C.S.3 (S.C.S.2)
C.S.3 (S.C.S.0)
C.S.9 (S.C.S.5)
C.S.7 (S.C.S.3)
C.S.1 (S.C.S.1)
C.S.3 (S.C.S.1)
C.S.1 (S.C.S.1)
C.S.0 (S.C.S.0)
C.S.0 (S.C.S.0)
C.S.0 (S.C.S.0)
C.S.2 (S.C.S.1)
C.S.0 (S.C.S.0)
C.S.2 (S.C.S.2)
C.S.2 (S.C.S.1)
C.S.1 (S.C.S.1)
C.S.1 (S.C.S.1)
C.S.99 (S.C.S.37)
C.S.36 (S.C.S.10)
C.S.25 (S.C.S.5)
C.S.13 (S.C.S.4)
C.S.9 (S.C.S.3)
C.S.19 (S.C.S.5)
C.S.12 (S.C.S.4)
C.S.10 (S.C.S.7)
C.S.13 (S.C.S.5)
C.S.16 (S.C.S.9)
C.S.10 (S.C.S.6)
C.S.14 (S.C.S.4)
C.S.4 (S.C.S.3)
C.S.4 (S.C.S.4)
Very High Damage Risk Zone - A (V50=55 m/s)
Very High Damage Risk Zone - B (V50=50 m/s)
High Damage Risk Zone (V50=47 m/s)
Moderate Damage Risk Zone - A (V50=44 m/s)
Moderate Damage Risk Zone - B (V50=39 m/s)
Low Damage Risk Zone (V50=33 m/s)
C.S = Cyclonic Storm Crossing one degree Latitude
(S.C.S) = Severe Cyclonic Strom Only
Note :
1. Probable maximum surge heights are shown in Flood Hazard Map of India
2. Number of C.S. (S.C.S) between 21° and 22° as shown are upto 90° east, hence the number crossing Indian coast upto about 89° will be less
bmtpc
Note : The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line


INDIA
Flood Hazard Map
0 100 200 300 400 500 km
Jammu & Kashmir
Himachal Pradesh
Punjab
Chandigarh
Uttaranchal
Haryana
Delhi
Uttar Pradesh
Rajasthan
Sikkim
Arunachal Pradesh
Assam
Nagaland
Meghalaya
Manipur
Tripura
Mizoram
Bihar
Jharkhand
West Bengal
Madhya Pradesh
Gujarat
Chhattisgarh
Orissa
Daman & Diu
Dadra & Nagar Haveli
Maharashtra
Andhra Pradesh
Goa
Karnataka
Pondicherry
Tamilnadu
Kerala
Lakshadweep
Andaman & Nicobar Islands
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
River
Area liable to Floods
( ) Probable Maximum Surge Height (m)
bmtpc
Note : The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line


INDIA
LANDSLIDE HAZARD ZONATION MAP
0 100 200 300 400 500 km
Jammu & Kashmir
Himachal Pradesh
Punjab
Chandigarh
Uttaranchal
Haryana
Delhi
Uttar Pradesh
Rajasthan
JAIPUR
LUCKNOW
KANPUR
Sikkim
Arunachal Pradesh
Assam
Nagaland
Meghalaya
Manipur
Tripura
Mizoram
Bihar
PATNA
VARANASI
Jharkhand
West Bengal
KOLKATA
Madhya Pradesh
JABALPUR
AHMADABAD
Gujarat
INDORE
Chhattisgarh
NAGPUR
Orissa
Daman & Diu
Dadra & Nagar Haveli
Maharashtra
MUMBAI
PUNE
HYDERABAD
Andhra Pradesh
Bay of Gengal
Arabian Sea
Goa
Karnataka
BANGALORE
CHENNAI
Pondicherry
Lakshadweep
COIMBATORE
Tamilnadu
Kerala
MADURAI
Andaman & Nicobar Islands
Severe to Very High
High
Moderate to Low
Unlikely
Snow covered areas
Indian Ocean
bmtpc
Note : The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line
BMTPC : Vulnerability Atlas - 2nd Edition; Peer Group, MoH&UPA; Map is Based on digitised data of SOI, GOI; Landslide Hazard Zonation Atlas of India, BMTPC



BMTPC : Vulnerability Atlas - 2nd Edition; Peer Group, MoH&UPA; Map is Based on digitised data of SOI, GOI; Seismic Zones of India Map IS:1893 - 2002; Seismotectonic Atlas of India, GSI, GOI

Distribution of Houses by Predominant Materials of Roof and Wall and Level of Damage Risk

INDIA

Wall / Roof		Census Houses		Level of Risk under								
				EQ Zone				Wind Velocity m/s				Flood Prone Area in %
		No. of Houses	%	V	IV	III	II	55 & 50	47	44 & 39	33	
				Area in %				Area in %				
INDIA				10.9	17.3	30.4	41.4	5.0	40.2	48.0	6.7	7.9
WALL												
A1 - Mud & Unburnt Brick Wall	Rural	65,807,212	26.4									
	Urban	7,991,950	3.2									
	Total	***73,799,162***	***29.6***	*VH*	*H*	*M*	*L*	*VH*	*H*	*M*	*L*	*VH*
A2 - Stone Wall	Rural	20,347,899	8.2									
	Urban	5,133,918	2.1									
	Total	***25,481,817***	***10.3***	*VH*	*H*	*M*	*L*	*H*	*M*	*L*	*VL*	*VH*
Total - Category - A		***99,280,979***	***39.9***									
B - Burnt Bricks Wall	Rural	62,715,919	25.2									
	Urban	49,175,710	19.7									
	Total	***111,891,629***	***44.9***	*H*	*M*	*L*	*VL*	*H*	*M*	*L*	*VL*	*H/M*
Total - Category - B		***111,891,629***	***44.9***									
C1 - Concrete Wall	Rural	2,253,979	0.9									
	Urban	4,286,359	1.7									
	Total	***6,540,338***	***2.6***	*M*	*L*	*VL*	*VL*	*L*	*VL*	*VL*	*VL*	*L/VL*
C2 - Wood wall	Rural	2,363,200	0.9									
	Urban	833,792	0.3									
	Total	***3,196,992***	***1.2***	*M*	*L*	*VL*	*VL*	*VH*	*H*	*M*	*L*	*H*
Total - Category - C		***9,737,330***	***3.9***									
X - Other Materials	Rural	24,049,304	9.7									
	Urban	4,136,627	1.7									
	Total	***28,185,931***	***11.4***	*M*	*VL*	*VL*	*VL*	*VH*	*H*	*M*	*L*	*VH*
Total - Category - X		***28,185,931***	***11.3***									
TOTAL BUILDINGS		**249,095,869**										
ROOF												
R1 - Light Weight Sloping Roof	Rural	69,342,567	27.8									
	Urban	17,350,091	7.0									
	Total	***86,692,658***	***34.8***	*M*	*M*	*L*	*VL*	*VH*	*VH*	*H*	*M*	*VH*
R2 - Heavy Weight Sloping Roof	Rural	65,299,492	26.2									
	Urban	13,036,138	5.2									
	Total	***78,335,630***	***31.4***	*H*	*M*	*L*	*VL*	*H*	*M*	*L*	*VL*	*H*
R3 - Flat Roof	Rural	42,895,454	17.2									
	Urban	41,172,127	16.5									
	Total	***84,067,581***	***33.7***	*Damage Risk as per that for the Wall supporting it*								
TOTAL BUILDINGS		**249,095,869**										

Housing Category : Wall Types

Category - A : Buildings in field-stone, rural structures, unburnt brick houses, clay houses

Category - B : Ordinary brick building; buildings of the large block & prefabricated type, half-timbered structures, building in natural hewn stone

Category - C : Reinforced building, well built wooden structures

Category - X : Other materials not covered in A,B,C. These are generally light.

Notes: *1. Flood prone area includes that protected area which may have more severe damage under failure of protection works. In some other areas the local damage may be severe under heavy rains and chocked drainage.*

2. Damage Risk for wall types is indicated assuming heavy flat roof in categories A, B and C (Reinforced Concrete) building

Housing Category : Roof Type

Category - R1 - Light Weight (Grass, Thatch, Bamboo, Wood, Mud, Plastic, Polythene, GI Metal, Asbestos Sheets, Other Materials)

Category - R2 - Heavy Weight (Tiles, Slate)

Category - R3 - Flat Roof (Brick, Stone, Concrete)

EQ Zone V : Very High Damage Risk Zone (MSK > IX)

EQ Zone IV : High Damage Risk Zone (MSK VIII)

EQ Zone III : Moderate Damage Risk Zone (MSK VII)

EQ Zone II : Low Damage Risk Zone (MSK < VI)

Level of Risk : VH = Very High, H = High, M = Moderate; L = Low; VL = Very Low

Distribution of Houses by Predominant Materials of Roof and Wall and Level of Damage Risk

GUJARAT

Wall / Roof		Census Houses		Level of Risk under								
				EQ Zone				Wind Velocity m/s				Flood Prone Area in %
		No. of Houses	%	V	IV	III	II	55 & 50	47	44 & 39	33	
				Area in %				Area in %				
State - GUJARAT 24				18.6	13.2	67.3	.9	18.6	15.7	61.8		10.3
WALL												
A1 - Mud & Unburnt Brick Wall	Rural	2,538,713	20.4									
	Urban	319,603	2.6									
	Total	***2,858,316***	***23.0***	*VH*	*H*	*M*	*L*	*VH*	*H*	*M*		*VH*
A2 - Stone Wall	Rural	1,104,797	8.9									
	Urban	469,236	3.8									
	Total	***1,574,033***	***12.7***	*VH*	*H*	*M*	*L*	*H*	*M*	*L*		*VH*
Total - Category - A		***4,432,349***	***35.6***									
B - Burnt Bricks Wall	Rural	2,978,388	23.9									
	Urban	3,755,362	30.2									
	Total	***6,733,750***	***54.1***	*H*	*M*	*L*	*VL*	*H*	*M*	*L*		*H/M*
Total - Category - B		***6,733,750***	***54.1***									
C1 - Concrete Wall	Rural	74,592	0.6									
	Urban	141,529	1.1									
	Total	***216,121***	***1.7***	*M*	*L*	*VL*	*VL*	*L*	*VL*	*VL*		*L/VL*
C2 - Wood wall	Rural	46,266	0.4									
	Urban	106,073	0.9									
	Total	***152,339***	***1.3***	*M*	*L*	*VL*	*VL*	*VH*	*H*	*M*		*H*
Total - Category - C		***368,460***	***3.0***									
X - Other Materials	Rural	782,417	6.3									
	Urban	130,019	1.0									
	Total	***912,436***	***7.3***	*M*	*VL*	*VL*	*VL*	*VH*	*H*	*M*		*VH*
Total - Category - X		***912,436***	***7.3***									
TOTAL BUILDINGS		**12,446,995**										

ROOF												
R1 - Light Weight Sloping Roof	Rural	1,899,498	15.3									
	Urban	1,284,602	10.3									
	Total	***3,184,100***	***25.6***	*M*	*M*	*L*	*VL*	*VH*	*VH*	*H*		*VH*
R2 - Heavy Weight Sloping Roof	Rural	4,198,084	33.7									
	Urban	542,169	4.4									
	Total	***4,740,253***	***38.1***	*H*	*M*	*L*	*VL*	*H*	*M*	*L*		*H*
R3 - Flat Roof	Rural	1,427,591	11.5									
	Urban	3,095,051	24.9									
	Total	***4,522,642***	***36.4***	*Damage Risk as per that for the Wall supporting it*								
TOTAL BUILDINGS		**12,446,995**										

INDIA

Wall / Roof		2001 Census Houses		2011 Census Houses	
		No. of Houses	%	No. of Houses	%
INDIA					
WALL					
A - Mud / Unburnt Bricks	Rural	6,58,07,212	26.4	6,60,82,280	26.5
Unburnt Brick Wall with mortar	Urban	79,91,950	3.2	1,08,08,689	4.3
Total - Category - A		***7,37,99,162***	***30***	***7,68,90,969***	***31***
B - Burnt Bricks + Stone packed	Rural	8,30,63,818	33.3	10,45,52,560.0	42.0
with mortar	Urban	5,43,09,628	21.8	7,50,35,035.0	30.1
Total - Category - B		***13,73,73,446***	***55***	***17,95,87,595***	***72***
C1 - Wood + Concrete	Rural	46,17,179	1.9	58,31,438.0	2.3
	Urban	51,20,151	2.1	79,33,512.0	3.2
Total - Category - C		***97,37,330***	***4***	***1,37,64,950***	***6***
X - Other Materials	Rural	2,40,49,304	9.7	3,00,97,412.0	12.1
	Urban	41,36,627	1.7	45,41,522.0	1.8
Total - Category - X		***2,81,85,931***	***11***	***3,46,38,934***	***14***
TOTAL BUILDINGS		**24,90,95,869**		**30,48,82,448**	
ROOF					
R1 - Light Weight	Rural	6,93,42,567	27.8	7,94,30,355	26.1
Sloping Roof	Urban	1,73,50,091	7.0	2,12,69,826	7.0
	Total	***8,66,92,658***	***34.8***	***10,07,00,181***	***33.1***
R2 - Heavy Weight	Rural	6,52,99,492	26.2	7,40,34,404	24.3
Sloping Roof	Urban	1,30,36,138	5.2	1,96,49,099	6.4
	Total	***7,83,35,630***	***31.4***	***9,36,83,503***	***30.7***
R3 - Flat Roof	Rural	4,28,95,454	17.2	5,30,98,931	17.4
	Urban	4,11,72,127	16.5	5,73,99,833	18.8
	Total	***8,40,67,581***	***33.7***	***11,04,98,764***	***36***
TOTAL BUILDINGS		**24,90,95,869**		**30,48,82,448**	

Housing Category by Wall Types

Category-A: Buildings in field –stone, rural structures, unburnt brick houses, clay houses

Category-B: Ordinary brick building: buildings of the large block & prefabricated type half timbered structures, building in natural hewn stone

Category-C: Reinforced building, well built wooden structures

Category-X: Other materials not covered in A,B,C. These are generally light (see R1)

- Damage Risk for Wall types is indicated assuming heavy flat roof in categories A,B and C: Reinforced Concrete Buildings.

Source of Housing Data: Census of Housing, GoI, 2011.

Housing Category by Roof Type

Category- R1: Light Weight (Grass, Thatch, Bamboo, Wood, Mud, Plastic, Polythene, G1 Metal, Asbestos Sheets, Other Materials)

Category- R2: Heavy Weight (Tiles, Slate)

Category- R3: Flat Roof (Brick, Stone, Concrete)

Earthquake Hazard Proneness

- EQ Zone V: Very High Hazard Zone (MSK>IX)
- EQ Zone IV: High Hazard Zone (MSK VIII)
- EQ Zone III: Moderate Hazard Zone (MSK VII)
- EQ Zone II: Light Hazard Zone (MSK VI)

Level of Damage Risk

- Level of Risk: VH = Very High, H= High, M= Moderate, L= Low, VL= Very Low

Source: Dr. A.S.Arya

Promoting Earthquake Safe Construction

- Disaster related standardization – Formulation of Standards / Codes of Practice for earthquake safe design and construction was taken up in early 60's by BIS with main technical support from the then University of Roorkee (now IITR)

- Guidelines and Handbooks – Central Public Works Deptt, Building Materials & Technology Promotion Council, Indian Building Congress

Promoting Earthquake Safe Construction

contd....

- Hands-on-Training Manuals for artisans, under G.O.I and UNDP Programme on Disaster Risk

- Guidelines on bamboo based design and constructions particularly for North East States – By BMTPC

Bamboo based earthquake and wind resistant buildings in Mizoram (Source: BMTPC Annual Report)

Seismic Strengthening and Retrofitting

- Large building stock (Houses, Schools, health centres, community buildings, small administrative buildings.) in non-engineered category. BMTPC with several NGOs, State Govts. has taken initiatives to promote retrofitting of simple non-engineered building.

- To create confidence of local people in suggested retrofitting methods, Field shock Table, Method was developed and demonstrated for Load Bearing Masonry Structures.

Retrofitting of Sub-District Hospital Building at Kupwara, J&K

Retrofitting of MCD School Buildings

Retrofitting of Police Station cum Mamlatdar Office Building at Rapar, Gujarat

Before retrofitting

After retrofitting

Seismic Strengthening and Retrofitting

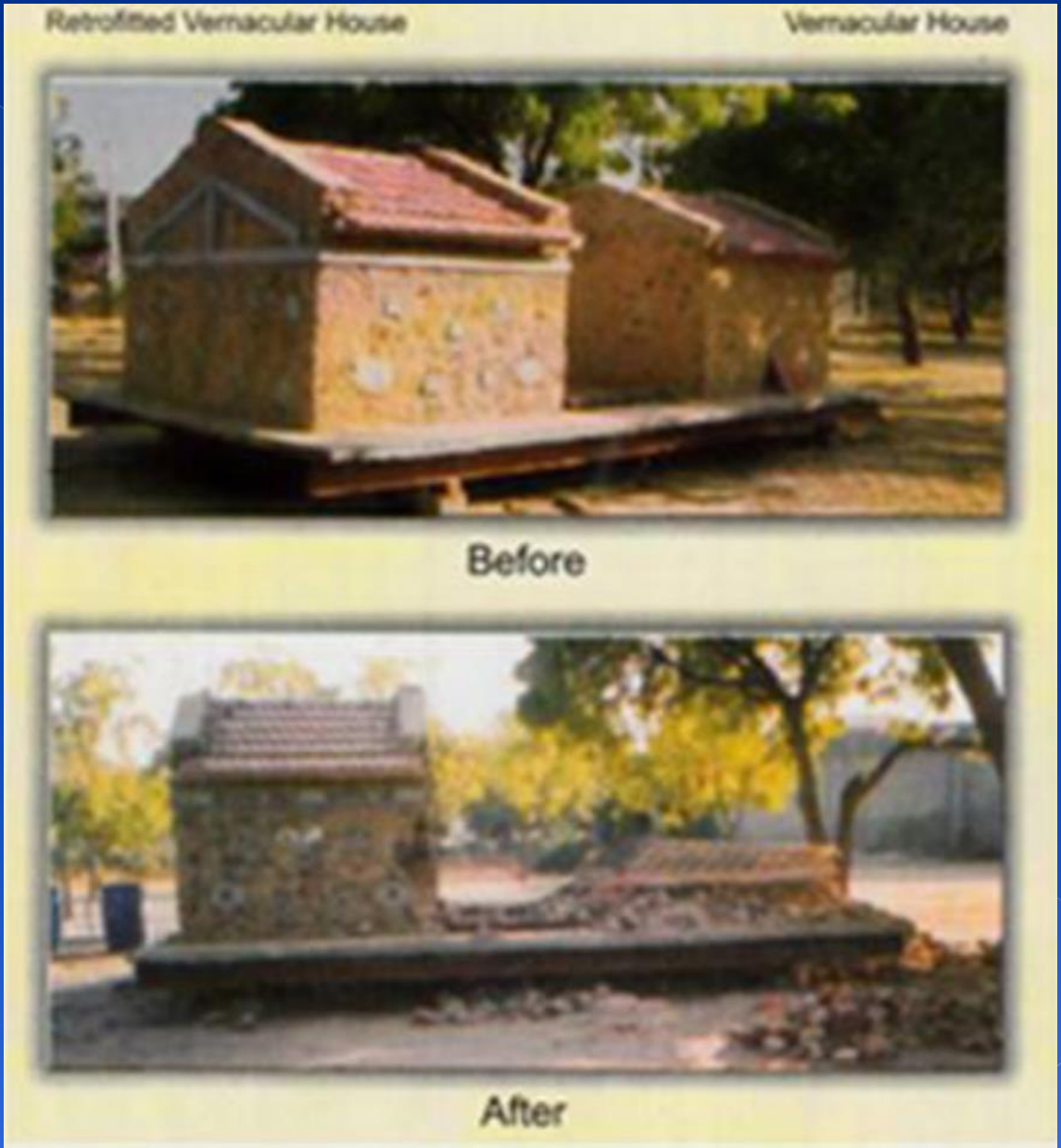
contd....

- Indian Standards on Retrofitting
  - ✓ IS : 13828 – 1993
  - ✓ IS : 13827 – 1993
  - ✓ IS : 18935 – 1993

  } Low strength masonry building

- Institutions like IIT Roorkee Kanpur, SERC Chennai, BMTPC have developed manuals / Guidelines on cost effective and simple retrofitting techniques

Shock Table Test



Strengthening Regulatory Framework for disaster resistant design and construction

Concerned with lack of compliance and weak enforcement without legislative support, Govt. of India set up Multi Disciplinary Expert Group (2004) to study existing regulatory instruments at local, State and Central levels and recommend a Regulatory Framework for disaster safe buildings and land-use zoning.

Recommended framework now being practised consist of following components;

a) Land use Zoning Regulations
   - Identification earthquake and landslide prone areas
   - Approach for land use Zoning for various development purposes

Strengthening Regulatory Framework for disaster resistant design and construction contd....

b) Development Control Rules
   - Requirements of site
   - Procedure for seeking permission

c) Amendments in building Bylaws for structural safety of buildings on different types of sites,

d) Mandatory requirements
   - Design basis report
   - Certification from Geotechnical (liquefaction free site) and structural engineer, architects
   - Report from geology & mining deptt. for stability of slope in hilly areas.

Strengthening Regulatory Framework for disaster resistant design and construction

contd....

e) Qualifications based registration/licensing of design and construction professionals by ULBs.

f) Special requirements for earthquake safety for schools, hospitals and multi-storeyed (high rise buildings) and special structures

Capacity Development

- Education, Research & Development, Awareness & Sensitization, Training

  Training

  - ✓ Officials & professionals of local authorities for scrutiny of designs and building permissions
  - ✓ Private practicing architects, town planners, civil engineers
  - ✓ Construction Supervisors
  - ✓ Masons, barbenders etc.

Capacity Development ...contd.

Education

- Subjects on Earthquake Engineering have been included at under graduate levels of civil engineering and architecture schools
- There is a need to develop short term courses and their curriculum in following areas related to Geotechnical Earthquake Engineering:
  - Geotechnical seismic site characterization
  - Geotechnical considerations for safety of built environment
  - Planning, design and construction of buildings on or close to active faults
  - Identification, assessment and mitigation of liquefaction hazards

Thank you.